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## HEALTH EDUCATION IN A DEMOCRACY<sup>1</sup>

By Dr. C.-E. A. WINSLOW

PROFESSOR OF PUBLIC HEALTH, YALE SCHOOL OF MEDICINE

THE Health Education Institute is a remarkable institution and it is a great pleasure to watch its progress from year to year. I take a certain vicarious pride in it on account of the large part that my colleague, Professor Hiscock, has played in its development in the past. It is fascinating to see its scope widen and deepen. Particularly this year, apparently, your stress has been not so much on what may properly be called propaganda—although propaganda is important and desirable—but on community organization. Such a tendency toward community organization is a practical application of your basic maxim of education by doing. Education by committee is far more effective than education by poster or bulletin or

cinema. The whole trend, the inherent drive of your educational ideas has brought about the realization that community action is the most powerful educational force; it's the thing that works. While I was in this field many years ago I felt very strongly that while bulletins and posters and meetings and so on were helpful they were like the torchlight processions of those days and the rallies that were held during a political campaign. Those things were after all only the trimmings. They didn't win the election. What won the election was the ward committee and the ward chairman working 365 days in the year. The kind of permanent health organization that has been developed in many communities is not only educationally sound in that it involves the activity of self-educated members but it is also the potent way to develop community action.

<sup>1</sup> This paper was presented before the Health Education Institute at the annual meeting of the American Public Health Association in St. Louis, October, 1942.

I was particularly proud this morning to note that four of the seven speakers were graduates from the Yale Department of Public Health. But Dr. Walker certainly didn't learn his pessimism there. He seemed to be dissatisfied with what he called a definition of health education. Health education, he said, is something that happens inside to change actions in a certain direction. You couldn't have a better definition than that. We don't know what lead is or copper or wood. Science doesn't know what anything is except by its actions. Lead is the thing that reacts in a certain way when you apply acid to it and which has a certain weight and so on which affects scales in a certain way. Dr. Walker's definition is a good scientific definition. Something happens inside; it doesn't matter what it is, but you measure it by its results. If it changes action in a certain direction it is successful health education. Here, as in all other fields of human thought and human activity, it's easier to think things out than to do them, and we mustn't fall into the danger of going back from a meeting like this and assuming that because very sound principles of community organization have been formulated they're necessarily going to be applied. Progressive educators very long ago formulated similar principles to those we've heard stated here for school education. They, too, agreed many years ago that education in schools should be something that was self-motivated, that should arise out of a conscious need of the students in the classroom, but I wonder how many schools of the country are actually operating just that way to-day; and the actual realization of this idea of motivation through conduct is still a long way ahead.

Only a week or two ago we had in our clinical case conferences for the medical students a session on tuberculosis and three cases were reported. In these clinical case conferences the students are supposed to have visited the home and come in contact with all the social agencies. They approach the case from the standpoint that somebody was sick and nobody ought to be sick. What was the matter? Who failed here? Now in one of those cases there was no failure. The machinery worked almost perfectly. In the other two cases, curiously enough (for what happened this year couldn't have happened ten or fifteen years ago), the medical and community machinery of the ordinary type worked about 100 per cent., too. There is nothing you could say that should have been done differently, except patient cooperation. It happened that the failure in two of the three cases was entirely due to the problem of internal emotional motivation; and of course we're not satisfied now to say merely that the patient was "uncooperative." The problem as it happened in two out of the three cases was a problem of health education in the sense of the development

of the right kind of motivation. Two out of these three families were governed by motivations that were absolutely hostile to modern health and medical service.

Furthermore, I'd like to point out that this task of motivation is going to be rather more difficult in the future than it has been in the past. In general, health education has started with objectives that were quite obviously desirable for the individual. A person who is beginning to come down with tuberculosis ought to be about as easy to motivate toward getting well as anybody could be. As I say, in these two cases, this wasn't true, but still, it's a relatively easy problem. Furthermore, the concept that was prominent twenty years ago was the protection of one individual against contagion from another. And that after all is fairly simple motivation. Nobody wants the germ of tuberculosis to be introduced into his home. We began with fairly easy types of motivation and in the future I think we're coming more and more to deal with problems where the fundamental motivation is much more difficult. We can see without any question that the chief causes of death in the future will not be germ diseases and that the motive of protection against infection is not going to be a vital part of the picture. The chief causes of death are more and more going to lie in the individual and in his social environment, and our educational objectives will not be anything as simple and obvious as the concept of distributing tuberculosis germs by spitting on the sidewalk. Furthermore, as we see the public health movement, the future causes of death are in themselves very minor parts of the problem. Success of the public health movement in the future is not going to be measured by changes in the death rate. Our ideal is going to be health and not merely keeping out of the mortality records of the statistician. It's going to be that sort of thing which I never tire of quoting, the statement of William James that "merely to live, move, and breathe should be a delight." That's what we mean by health. And thus we can not be satisfied merely with alleviative medicine; we must not be satisfied even with merely preventive medicine.

We haven't got very much preventive medicine yet, but if we had, that isn't enough. After all, the term "preventive" is a negative thing. Something like *constructive medicine* is what we shall want in the future—medicine that will be actuated by the upbuilding of health and not merely by protection against specific diseases. And we already have something like that operating in the field of pediatrics. I don't think it's general in any other branch of medicine, but pediatric practice is coming to be something in the nature of constructive medicine. It is rather interesting though that even in pediatrics (I inquired about this a little

while ago) the text-books are still all written around diseases. There isn't even in pediatrics a text-book written about the health of the child in the first three months and the health of the child in the second year, and so on. They are all still under disease headings. But the practitioners have got ahead of the text-books, as very often happens. And if health is constructive, health must of course include mental and social as well as physical health. Now those things are less easy to realize and above all they haven't the compelling force of direct danger to one person from another. You remember that the first impulse in the development of the factory laws in Great Britain 140 years ago was the idea that disease was spreading among the apprentice laborers and would spread to the rest of the community.

Such a motive is not so obvious in the case of the health problems of the future. You can fairly easily get people to pay taxes for protection against epidemics, but it's going to be a good deal more difficult to obtain the kind of motivation that will justify financial sacrifices for housing and medical care and social security. The argument "am I my brother's keeper" is used by many who would deprecate any comparison of themselves to the one who first used that phrase. Yet no society is healthy when a third or a tenth of the nation lacks the essential decencies of normal life and the difficult task of the health educator in the future is to convince the public that this is true, that the existence of a substandard slum area is a menace to the city, not in the crude sense that smallpox is going to spread from it but in a sense that the social life, the communal life of the community, is going to be poisoned by these gross inequalities in social structure.

Our problem is even more grave, however. This conception of interactions, this conception of the fact that we all are parts one of another, has got to be realized on an international as well as on a national scale. Some people don't want to think about that. The McCormicks and the Pattersons who a year ago didn't want to prepare for war (and now just those same people don't want to prepare for peace) say, "Let's talk about nothing else but the immediate job of winning the war." They are again showing the same characteristic short-sightedness or possibly fundamental subconscious sympathy with the objectives of the enemy. We can't separate the war and the post-war problems in this case. Some wars have been such that you could set aside and put away social gains. They've been wars for territory or national prestige. This isn't that kind of a war. It's a war for an idea, a war for a way of life, and it's impossible to win a war of the gravity and seriousness of this one without "full cooperation" as Mr. Willkie so

splendidly pointed out last night. Furthermore, if you could win it at the sacrifices of the fundamental welfare of the people of this or any other country you wouldn't have really won because that is, after all, what we are fighting for, a way of life, an opportunity for all people. That is the very issue that is at stake. People will agree to this very readily in theory, but I happened to hear two instances recently that interested me. One was a Rotary Convention in Toronto last spring at which a friend of mine spoke eloquently on the post-war world and one of the members came up to him afterwards and said "That was a splendid speech, perfectly magnificent, I agree with everything you said, but of course, remember this, there mustn't be any tinkering with the tariff." The other instance was a Labor Convention in New Jersey at which ideals of a new world order were widely applauded until the question was raised whether the post-war industrialization of China would not menace the standard of living of the American workingman.

I assume we're going to win the war, and we might as well assume that, because if we don't nothing matters anyhow. But assuming we're going to win it, our task is only half done. We must also win the peace; and that means building a new world in which all the people in all the nations have a fair chance to improve their social status. I think that England has learned her lesson and is in the mood to build such a world order. Russia and China are committed to it. The vital question of the post-war period is whether we in the United States are going to be ready as a people to meet this challenge or whether we are going to do what we did in 1920 and give up in peace all that we had won in war. There is a very peculiar challenge to the United States to perceive the importance of world health and recognize its own responsibilities toward world health in a broad sense of the term. As you see, that challenge goes to the very heart of our problem of education. And one thing that has been emphasized in these discussions this morning is what I like to visualize as marking the difference between education and training. All through schools and colleges and universities you must have both training and education. By training I mean something that develops an automatic response to external stimuli. We train a dog to go to heel. We train a child to speak English. We train a medical student to recognize the eruption of measles. We train an engineer to apply a mathematical formula. Those are all valuable forms of training, but they are not education. The word "education" means to lead out, it involves a widening of vision and a deepening of thought. It's an imaginative, a creative process.

Education is not possible for a dog in this sense. Education is possible for a man, outside of Nazi Germany and Japan where nothing but training is permitted. It is very wholesome often to begin with training and develop into education. You remember that the great centers of philosophy in Greece, the academy of Plato and the Lyceum of Aristotle, were both gymnasia. They were originally places for physical exercise which became centers of the greatest schools of philosophy in the world. The medieval universities were primarily technological. They were intended to train men for the priesthood. The modern university is, and in a large measure ought to be, based largely on technology; but these institutions fail terribly of their purposes if they remain training institutions, if they remain merely technological. It is an interesting thing to realize—perhaps it is one of the lessons that the war teaches—that technology instead of making fundamental education in the old sense unnecessary makes it enormously more necessary. The greater the mastery of man over the material world, the more difficult become the relations between men as men, and the more vital becomes real education which doesn't just train men to respond automatically to stimuli but trains them to understand and to want sound relationships, the most precious fruit of which is in cooperative action. No nation that does not have effective cooperation can survive. Pure individualism is only possible to the pioneer in the wilderness. So that the problem is not whether we shall have cooperative action or not, but what kind of cooperative action we have. And there are two ways, these two same old ways, of getting it, training and education. Training is, of course, the easiest way.

Did any of you read (and I hope you have, it's one of the most significant of recent war books) Smith's "Last Train from Berlin"? Among the disheartening things in it are his pictures of the tremendous power and efficiency with which all initiative, all imagination, all sympathy, all human quality is trained out of the victims of the Nazi régime, and the way they are molded into a rigid, utterly heartless, terribly powerful machine. Training is relatively easy, but after all the trouble is that it's inadequate to meet conditions

in this changing universe. The moth which flies toward the sun also flies into a flame, the merely trained person, when conditions are altered, when conditions become complex, if he has no education, no orientation, is as likely as not to march off a cliff into the sea. We are witnessing to-day a world struggle between, on the one hand, peoples who are fully trained and on the other hand our own peoples who are half educated. And that is our problem in the Solomon Islands now. We're suffering because we are half-educated people meeting a very fully trained people and our task is, of course, to complete that education in a sense of the understanding of relationships and of the need and possibilities of cooperative action by democratic consent. It would be easy to produce common action by training, but in this country we are trying a more difficult and a nobler experiment. We are seeking to accomplish the aims of national planning by common consent and not by compulsion, to create a new social economy within the framework of a democratic order and without loss of the essential values of the older liberalism. Our success is still problematic. Whether the obstructive forces of ignorance and selfishness can be overcome without Naziism or Fascism is still on the knees of the gods, but on the success or failure of this experiment may depend the course of civilization for a century to come. The problem to-day is: "Can we on our side achieve cooperative action by common consent? Can we do it in the war? Can we do it in the peace that follows?"

The answer, the only possible hopeful answer, lies in the fullness of education, in the development of education to the point that you have visualized in your particular field, but education which comprehends the entire picture of man's life and his relations to the international environment, the world in which he lives. You can truly feel you are doing your part, and you, with leaders in other fields, must go on with the type of education that gives a sense of the fullness of personal health and the fullness of communal cooperative living, not just as an idea, a phrase, but actually as a compelling force in the governance of the motivation of mankind.

## NICHOLAS COPERNICUS

THE FATHER OF MODERN ASTRONOMY 1543-1943

By STEPHEN P. MIZWA

SECRETARY OF THE KOSCIUSZKO FOUNDATION AND OF THE COPERNICAN QUADRICENTENNIAL NATIONAL COMMITTEE

ON May 24, 1943, the civilized world—or whatever remains of it—will commemorate the four hundredth anniversary of the death of Nicholas Copernicus, the

great Polish astronomer, whose immortal work "De Revolutionibus Orbium Coelestium" revolutionized man's outlook upon the universe.

At the initiative of the Kosciuszko Foundation, which, since 1925, has endeavored to promote cultural relationships between Poland and America, one of the greatest scientific tributes in history is being planned throughout the United States for May 24th, when hundreds of American universities, colleges, private schools and technical institutions will join the Foundation in paying tribute to one of the truly great geniuses of the world. Most of the Canadian colleges and universities and the Royal Astronomical Society of Canada are making similar plans. Appropriately enough in Latin America the initiative was taken by the oldest university on the American continent, that of San Marco in Lima, Peru, which was established in 1551. The New York Public Library, the Library of Yale University and many other scientific and public libraries all over the country are making plans to place in special exhibitions old editions of Copernicus's works and many rare and interesting items pertaining to the great astronomer. These Copernicana exhibition plans have already revealed that there are several copies in the United States, and at least one in Canada, of the first (1543) edition of "*De Revolutionibus*," the first copy of which its creator beheld on his deathbed on the very last day of his mortal journey. Several of our planetaria are planning special programs for the month of May, demonstrating and explaining the pre-Copernican and the Copernican systems of the universe. At Carnegie Hall in New York, on May 24th, there will be held a meeting in tribute to Copernicus under the auspices of the Copernican Quadricentennial National Committee, headed by Professor Harlow Shapley of Harvard as chairman, whose membership will include distinguished scientists, representatives of the leading learned societies and research institutions, higher institutions of learning and representative Americans.

"Why stop to pay tributes to anybody in times like these, when we are waging a war of the survival?" "What did Copernicus do?" "Who was Copernicus, anyway?" These questions are not intended as an insult to the intelligence of the readers of this journal. They are simply pegs on which to hang one's thoughts. And they are not impertinent, either. They have been raised even by intelligent people. Within one week the present writer met three college graduates whose liberal education was deficient at least in one respect. One frankly admitted he never heard of Copernicus. Another thought that he (*i.e.*, Copernicus and not the college graduate) had something to do with the moon. And the third was sure that judging by the sound of the name, Copernicus must have certainly been a Greek philosopher.

At any rate, who was he and what did he do to deserve such a national tribute as is being planned

even in times like these? The answer implies deeper significance than mere recognition of a great scientific genius. It is not alone the transcendent mind of Copernicus the scientist that stirs one's imagination; it is also his heart, the sum total of his interests and his manner of doing things that commend him to our attention, even in times of turmoil like these. He also lived in an age of mental revolution, of spiritual conflicts and of political turmoil. He took active part in the political turmoil, withstood the pressure of spiritual conflicts, and out of the mental revolution he brought us a new conception of the place of this homely planet of ours in the celestial scheme of things. Like the mythical Prometheus, who stole the fire from selfish pagan gods by holding a rod close to the sun, Copernicus snatched a big chunk of truth—to use the college vernacular—from the bosom of stubborn nature which zealously guards her secrets from inquisitive man.

As astronomer and mathematician, for he is generally known as that, he did have "something to do with the moon." But he did more than that. Whether speaking jovially or contemptuously, Martin Luther referred to Copernicus as that "fool who would overturn the whole science of astronomy." That is just exactly what he did. He rebuilt the whole science of astronomy on an inverted order; he bade the sun to stand still and set the earth in motion, set it on its eternal course around the sun. Of course, like Monsieur Jardin who spoke prose all his life without knowing it, the earth was always coursing around the sun; but for centuries laymen and learned men spoke poetry when they maintained the geocentric theory that the earth—whether flat or spherical—was the center of the universe and it was the sun that moved around. By reversing the process Copernicus created the so-called heliocentric (with the sun as the center) law of planetary motions.

This is easier said than done. It took more than daring intellectual courage and fantastic imagination to essay the heights of heavens. It took tact and spiritual courage to maintain his views not as a hypothesis, useful for astronomical calculations though not necessarily true, as some of his friends advised him to do, but as an established scientific truth. By his tenacity he loosened the grip of the dead hand of authority—authority of accumulated scientific and church dogmas, authority of all his learned predecessors and contemporaries, authority of the sense of vision, authority of the stubborn pride of man who, in the geocentric system, saw himself as ruler over the entire center of the universe. According to the Copernican conception, man became just a speck of dust clinging tenaciously for his dear life, on the surface of the earth as it majestically swings around

the sun. Yes, Copernicus showed tact when he dedicated his great treatise to Pope Paul III and pleaded that he also be given the freedom of scientific inquiry—to follow the truth wherever it may lead. In paying tribute to Copernicus of four hundred years ago, the scientific word of to-day reaffirms its own faith in the dignity of free scientific inquiry, which has practically always been the transatlantic American charter. Why do we stop to honor Copernicus to-day? Because his words of courage and his message to the contemporary scientific world are as modern as to-morrow.

But Copernicus was more than a scientist. He was a churchman, a painter and a poet, a physician, an economist, a statesman and a soldier. He was not fully ordained a priest as some people erroneously believe; he had only minor orders. In the church hierarchy he was a canon, charged with the duty of administering church property in the duchy-bishopric of Varmia, the then Polish province but after the first partition of Poland in 1772 incorporated in East Prussia. In his varied career he painted his own portrait. The original, unfortunately, has not been preserved. We know it only from the copy that was produced in the sixteenth century and later reproduced on the astronomical clock tower of the Cathedral of Strasbourg. His first published book, in 1509, revealed him as a poet and incipient man of letters. It was a translation of the epistles of a secondary Greek writer, Theophylact. As a physician he would have made a much greater reputation than that of a poet if astronomy had not absorbed his interest in mature years. Such reputation concerning his medical profession as has come down to us has been clothed more in the garb of philanthropy rather than that of professional shrewdness. Although not infrequently called to the bedside of the influential and the affluent, including ruling princes, in his capacity as physician

he is best known by his gratuitous ministrations to the poor. He was also an economist. Called by the Polish king, Sigismund I, to help reform the currency system in the northwestern Polish provinces, Copernicus formulated the monetary law of "good and bad money," which through historical error was ascribed to Gresham and the principle became known as Gresham's Law. Copernicus formulated this law at least 22 years before Sir Thomas Gresham.

And, among his multifarious activities, Copernicus was a statesman and once even a soldier. All his life he was an inveterate enemy of the Knights of the Teutonic Order, whose possessions—East Prussia, then Fief of Poland—surrounded the province of Varmia on three sides. This order, then headed by Albert of Hohenzollern, was the direct predecessor of the present widely heralded Teutonic New Order of Europe, introduced or revived by a formerly much-heard-of Austrian corporal. The former Teutonic Order knew all the tricks of fifth-column work; it tried to create dissensions and foment disorders in the neighboring Polish provinces. Several letters of complaint to the king of Poland, drawn up by the pen of Copernicus on behalf of the bishopric of Varmia, have come down to us. Without mincing words, Copernicus called them "thieves and robbers." While on his business visit to the city of Olsztyn (Allenstein), which was surrounded by armed forces of the Teutonic Order, Copernicus assumed the function of commander in chief.

And now, while the descendants of the Knights of the Teutonic Order have closed the University of Krakow, the alma mater of Copernicus, have imprisoned most of its professors and murdered others, and are trying to destroy all visible monuments of Polish culture, a tribute to Copernicus will give the still surviving Polish scholars and the gallant Polish nation courage to endure.

## OBITUARY

### HARRY HAMILTON LAUGHLIN

DR. HARRY HAMILTON LAUGHLIN, son of George Hamilton Laughlin, one-time president of Hiram College, was born in Oskaloosa, Iowa, in 1880. He was graduated Sc.D. from Princeton and was given an honorary M.D. degree by the University of Heidelberg. At the age of twenty years he was principal of the Kirksville (Mo.) high school and later teacher of agriculture at the North Missouri State Normal School. At the foundation of the Eugenics Record Office by Mrs. E. H. Harriman in 1910 he was put in immediate charge of its administration, until in 1921 it was incorporated in the Department of Genetics, with him as assistant director.

He early showed a special interest in the application of the principles of human heredity to human affairs. As an expert for the Committee on Immigration and Naturalization of the House of Representatives he played an important part in securing the quota system of limited immigration into the United States from the Old World; and in 1923 he was sent by the Department of Labor to observe and advise concerning the operations of immigration selection in Europe. He was appointed a member of the Permanent Emigration Committee of the International Labor Office of the League of Nations. Later he worked especially on the topic of sterilization as a eugenical measure and published the stand-

ard book on the subject. His later years were devoted to a study of the inheritance of racing capacity in thoroughbreds—a trait in whose inheritance so many factors are involved that Laughlin was led to resort to mass analysis.

Laughlin was highly developed socially and made life-long friends through his interest in the people with whom he was associated.

At the outbreak of World War I he became captain of the local home defense reserve and gave military training of a quality that was acclaimed by army officers. He and Mrs. Laughlin were fond of entertaining at their house, and all the children of the neighborhood gathered there at Christmas time to meet him in the role of Santa Claus.

As an administrator he had unusual gifts and he was able to utilize effectively the work of a considerable number of assistants toward the accumulation and analysis of a very complicated mass of data. His thinking and writing were characterized by great perspicacity. His was a legal mind, and some of his drafts of bills for legislation were incorporated almost without change in the acts of state legislators. He was related to President James Madison.

Some of Laughlin's conclusions and their applications in legislation were opposed by those committed to a different social philosophy, founded on a less thorough analysis of facts. One can not but feel that a generation or two hence Laughlin's work, in helping bring about restricted immigration and thus the preservation of our country from the clash of opposing ideals and instincts found in the more diverse racial or geographical groups, will be the more widely appreciated as our population tends toward greater homogeneity.

CHAS. B. DAVENPORT

#### ROBERT GREENLEAF LEAVITT (1865-1942)

DR. ROBERT GREENLEAF LEAVITT, well-known biologist and writer, died at North Parsonsfield, Maine, on October 2, 1942.

Dr. Leavitt was born at North Parsonsfield on September 28, 1865. He graduated from Worcester Academy in 1884 and from Harvard University in 1889. He was granted an A.M. from Harvard in 1898 and a Ph.D. in 1904.

He was science master at De Veaux College, 1890-91; head master at Concord Home School, Concord, Mass., 1891-93; instructor in physics at Williston Seminary, Easthampton, Mass., 1893-97; investigator at Ames Botanical Laboratory, North Easton, Mass., 1899-1908; and head of the department of biology at the New Jersey State Normal School (now the New Jersey State Teachers College) at Trenton from September, 1908, until he retired in June, 1928. He

was instructor in botany at the Summer School of Harvard University, 1903-07; and after his retirement continued his researches and his writing and maintained an active interest in everything connected with his field.

He was the author of "Outlines of Botany," which after forty years' use as a textbook is still regarded as an authority, "The Forest Trees of New England," a very popular tree book written for the Arnold Arboretum of Harvard University, numerous articles in general and educational magazines, and numerous technical papers and bulletins. He was a fellow of the American Association for the Advancement of Science.

Dr. Leavitt possessed an unforgettable personality and a homely, original contagious wit which made him a delightful companion and in great demand as an after-dinner speaker and toastmaster. His genial and lovable nature won and held for him a multitude of friends.

His widow, two sons and a daughter survive him.

ROSCOE L. WEST

NEW JERSEY STATE TEACHERS COLLEGE,  
TRENTON

#### DEATHS AND MEMORIALS

DR. WILLIAM S. BAYLEY, who retired in 1931 from the professorship of geology at the University of Illinois, where he was head of the department, died on February 14 at the age of eighty-one years.

DR. ALBERT B. PECK, professor of mineralogy at the University of Michigan, a member of the faculty since 1914, died on February 15 at the age of fifty years.

DR. FRANKLIN P. JOHNSON, formerly professor of anatomy at the University of Missouri and since 1929 assistant professor of urology at the Medical School of the University of Oregon, died on February 12 at the age of fifty-five years.

MARTIN HALVOR KNUTSEN, professor of bacteriology at the Pennsylvania State College for the past twenty-three years, died on February 6 at the age of fifty-five years.

*Nature* reports the death of Dr. J. F. Craig, professor of veterinary pathology at the University of Liverpool; of Dr. Cyril Crossland, the first director of the Marine Biological Station at Ghardaqa, Gulf of Suez, on January 7, aged sixty-four years; of Lord Hirst, honorary member of the British Institution of Electrical Engineers, chairman of the General Electric Company, on January 23, aged seventy-nine years; of Dr. Alexander Russell, F.R.S., formerly principal of Faraday House, London, on January 14, aged eighty-one years; of Professor J. Strohl, professor

of zoology and comparative anatomy at the University of Zurich, and of Professor A. K. Cajander, formerly professor of forestry in the University of Helsinki and director-general of the State Board of Forestry in Finland, Prime Minister of Finland from 1922 to 1924 and from 1938 to 1939, on January 21, aged sixty-three years.

THE New York Academy of Medicine, in cooperation with the State Department of Health, the City Department of Health and six of the leading voluntary organizations in the fields of maternal welfare and child health, celebrated on February 19 the one-hundredth anniversary of the publication by Oliver Wendell Holmes of his paper entitled "The Contagiousness of Puerperal Fever." In connection with this celebration a full day's program of conferences and discussions was held. The principal speakers at the evening meeting were Dr. Reginald Fitz, of Boston, and Dr. Benjamin P. Watson, director of the Sloane Hospital for Women, New York.

*Nature* reports that to commemorate the birth, on March 3, 1843, of the distinguished metallurgist, Sir William Chandler Roberts-Austen, the British Insti-

tution of Mechanical Engineers, the Iron and Steel Institute and the Institute of Metals have arranged a lecture on his life and work, to be given by Dr. S. W. Smith.

THE section of historical and cultural medicine of the New York Academy of Medicine sponsored a Vesalius Celebration on January 13 to honor the quadricentenary of the publication of "De Humani Corporis Fabrica (1543)." The speakers were Drs. Arturo Castiglioni, Baltimore, on "Andreas Vesalius, Professor in the Medical School in Padua" and Henry E. Sigerist, of the Johns Hopkins University, on "The Position of Vesalius in the History of Medicine." There was an exhibit of books of Vesalius from the library of the academy.

THE *Journal* of the American Medical Association states that the chancellor and president of the University of Toronto and members of the university staff recently accompanied Lady Banting to Mount Pleasant Cemetery to place a wreath on Sir Frederick's tomb. The occasion marked the fifty-first birthday anniversary of Sir Frederick, codiscoverer of insulin.

## SCIENTIFIC EVENTS

### BRITISH COLONIAL PRODUCTS RESEARCH

THE Colonial Office has announced the appointment of a Colonial Products Research Council, with Lord Hankey as chairman. *The Times*, London, states that one of the functions of the Colonial Research Committee, which was set up last year under the chairmanship of Lord Hailey, was to review the whole field of research as it affects the Colonial Empire and to make recommendations for filling gaps in the existing organization for conducting such research. The new council fills one such gap.

Unlike the Colonial Research Committee, the council will be an executive body. It will consider what colonial raw materials may be made of value for the manufacture of intermediate and other products required by industry and it will initiate and supervise researches, both pure and applied, on such products, and generally consider how by the application of research greater use can be made of them.

In framing its program the council will have as its principal objective the promotion of the welfare and prosperity of Colonial peoples, and will endeavor also to increase the colonial contribution to the welfare and prosperity of the British Empire and of the world as a whole.

In carrying out its program, the council will cooperate with existing institutes, such as the Department of Scientific and Industrial Research, the Medical Re-

search Council and the Agricultural Research Council, to the greatest possible extent, and will "farm out" work to these and other bodies by arrangement; it will set up facilities of its own only for work which can not be done by other means. It will be appreciated of course that so long as the war continues, the investigations which the council will be able to undertake will necessarily be limited.

The council is composed as follows: Eric Barnard, Department of Scientific and Industrial Research; G. L. M. Clauson, Colonial Office; Aneurin Davies; Dr. J. J. Fox, Government Chemist; Professor W. N. Haworth; Sir Harry Lindsay, director of the Imperial Institute; Sir Edward Mellanby, Medical Research Council; Professor Sir Robert Robinson; G. W. Thomson, and Dr. W. W. C. Topley, Agricultural Research Council. Professor J. L. Simonsen, lately of the University College of North Wales, has been appointed director of research.

Certain members of the council are also members of the Colonial Research Committee and the council will work in close touch with that body. It will be financed out of the provision for research in the Colonial Development and Welfare Act.

### BIOLOGICAL ABSTRACTS

THE wide field which *Biological Abstracts* covers and the promptness with which its abstracts appear

have made it an indispensable adjunct to every biological department. Individual workers are especially concerned with only a part of the whole field, however, and for them the possibility of subscribing to one or more sections has been a great advantage. For most of us, even a section is rather large, and some means of collecting references to papers in a narrower field is essential. This is usually accomplished by a card file of some sort. For a number of years the present writer has been clipping from two of the sections the abstracts in his own field of interest, and pasting them in the upper left corner of 5 x 8 cards. This provides an easily prepared and legible means of filing and a considerable space for further notes in each paper. Doubtless other workers are using the journal in a similar way. Often, of course, two abstracts which are desired will occur on opposite sides of the same sheet, making it impossible to clip both of them and requiring the copying of one. It is therefore fortunate that *Biological Abstracts* is now offering for workers who use the sections in this way two copies of any section at a much reduced rate, which will make it possible to clip abstracts regardless of their location. Many biologists will doubtless take advantage of this offer of a convenient and relatively cheap means of building their individual bibliographical files.

EDMUND W. SINNOTT

YALE UNIVERSITY

#### THE COMMITTEE ON FOOD COMPOSITION OF THE NATIONAL RESEARCH COUNCIL

At the request of the Quartermaster General of the United States Army, the Food and Nutrition Board of the National Research Council has organized a Committee on Food Composition, Dr. C. A. Elvehjem, *Chairman*, to collect, coordinate and appraise food composition data. The committee is to act as the repository and point of dissemination for authentic data on all foods being used or considered for use by all branches of the Military Services.

Proximate and mineral composition as well as analyses for vitamins A, C, thiamine, riboflavin and niacin are required as a basis for nutritional evaluation of these foods. Data on new products, processed foods and dehydrated meats, fruits and vegetables especially are needed.

The committee has already enlisted the cooperation of Federal and State laboratories throughout the country. However, it is also aware that a great wealth of food composition data has been accumulated in the course of research and routine analyses by industrial laboratories.

It is the purpose of this communication to appeal to these laboratories of the food industries to make

their data active in the war effort. The committee assures that data received for this purpose will be handled with such reservations as should be exercised in the official utilization of this information by the Armed Services only.

Please address Dr. Paul L. Pavcek, Secretary, Committee on Food Composition, National Research Council, 2101 Constitution Avenue, Washington, D. C.

#### COMMITTEE OF THE NATIONAL RESEARCH COUNCIL ON THE MAINTENANCE OF PURE GENETIC STRAINS

DURING the past year, the Committee on the Maintenance of Pure Genetic Strains, National Research Council, has held two meetings for the purpose of preparing a list of the more important mutant strains and inbred lines. Information gathered thus far can be summarized as follows.

"*Drosophila* Information Service," prepared by Dr. M. Demerec and issued by the Carnegie Institution of Washington at Cold Spring Harbor, Long Island, New York, lists 60 species, 2,000 different stocks and 93 laboratories throughout the world where stocks are maintained.

*Mouse Genetic News*, edited by Dr. George D. Snell and issued by the Roscoe B. Jackson Memorial Laboratory at Bar Harbor, Maine, lists 70 inbred strains of mice and 40 laboratories in the United States where stocks are maintained.

Dr. C. C. Little, the Roscoe B. Jackson Memorial Laboratory, has listed a few mutant and inbred strains of guinea-pigs, rabbits and rats, together with institutions in which they are being maintained.

Dr. Walter Landauer, Storrs Agricultural Experiment Station, the University of Connecticut, has prepared a list of poultry and pigeons which includes 47 or more inbred strains of fowl, 5 of turkeys, 16 inbred or mutant strains of pigeons and 17 institutions in the United States where stocks are maintained.

Dr. Myron Gordon, American Museum of Natural History, New York City, is assembling a list of cold-blooded vertebrates which includes 7 species of Xiphophorini with 28 characters and several species and genera of fish maintained in at least 10 institutions.

Dr. P. W. Whiting, Zoological Laboratory, University of Pennsylvania, is preparing a list of insects other than *Drosophila* which include Orthoptera, Lepidoptera, 3 species of Diptera with mutant types, *Apis mellifica* with mutant types, *Habrobracon juglandis* with mutant types, and 6 institutions in which one or more stocks are maintained.

L. T. WEBSTER,  
*Chairman*

ROCKEFELLER INSTITUTE FOR  
MEDICAL RESEARCH

### THE UNION OF AMERICAN BIOLOGICAL SOCIETIES

THE annual meeting and dinner of the Council of the Union of American Biological Societies was held at the Hotel Normandie, Philadelphia, on January 17.

The business considered included a report of the "Committee on the Teaching of Biology" by its chairman, Dr. Oscar Riddle; a report on the activities of the "Cooperative Committee on Science Teaching" by the union's representatives, Dr. Oscar Riddle and Dr. W. F. Loehwing; a report on *Biological Abstracts* by its editor-in-chief, Dr. John Flynn.

It was decided that one of the major items on the agenda of the union for the immediate future would be the development of a program to establish closer relationships between the biologists of Latin America and those of the United States.

The following officers were elected to serve for the year 1943:

*President*, Dr. E. G. Butler, Princeton University.

*Secretary*, Dr. F. A. Brown, Jr., Northwestern University.

*Treasurer*, Dr. D. H. Wenrich, University of Pennsylvania.

*Members of the Executive Committee*, Dr. B. M. Duggar, University of Wisconsin; Colonel A. P. Hitchens, University of Pennsylvania, and Dr. G. W. Hunter, III, Wesleyan University.

FRANK A. BROWN, JR.,  
*Secretary*

### THE WASHINGTON ACADEMY OF SCIENCES

OFFICERS of the Washington Academy of Sciences have been elected as follows:

*President*, Leland W. Parr.

*Secretary*, F. G. Brickwedde.

*Treasurer*, Howard S. Rappleye.

*Vice-Presidents representing the Affiliated Societies:*

Philosophical Society of Washington, Raymond J. Seeger.

Anthropological Society of Washington, Frank M. Setzler.

Biological Society of Washington, Harry B. Humphrey.

Chemical Society of Washington, Herbert L. Haller.

Entomological Society of Washington, Austin H. Clark.

National Geographic Society, Alexander Wetmore.

Geological Society of Washington, Clarence S. Ross.

Medical Society of the District of Columbia, Frederick O. Coe.

Columbia Historical Society, Allen C. Clark.

Botanical Society of Washington, Charlotte Elliott.

Washington Section of the Society of American Foresters, William A. Dayton.

Washington Society of Engineers, Frank B. Scheetz.

Washington Section of the American Institute of Electrical Engineers, Francis B. Silsbee.

Washington Section of the American Society of Mechanical Engineers, Walter Ramberg.

Helminthological Society of Washington, Emmett W. Price.

Washington Branch of the Society of American Bacteriologists, Ralph P. Tittsler.

Washington Post of the Society of American Military Engineers, Captain C. L. Garner.

Washington Section of the Institute of Radio Engineers, Harry Diamond.

Washington Section of the American Society of Civil Engineers, Owen B. French.

*Elected members of the Board of Managers:* John E. Graf and Frederick D. Rossini.

## SCIENTIFIC NOTES AND NEWS

THE 1943 Washington Award, administered by the Western Society of Engineers, has been conferred on Andrey A. Potter, dean of engineering at Purdue University and chairman of the National Advisory Committee on Engineering and War Training, in recognition of "distinguished leadership in engineering education and research and patriotic service in mobilizing technical knowledge for victory in war and peace." Herbert Hoover received the first award in 1919. Other recipients include Arthur N. Talbot, Orville Wright, Michael I. Pupin, Charles F. Kettering, Frank B. Jewett and Ralph Budd.

THE 1942 Lamme Medal of the American Institute of Electrical Engineers has been awarded to Dr. Joseph Slepian, associate director of research, Westinghouse Electric and Manufacturing Company, East Pittsburgh, "for his contributions to the development

of circuit interrupting and current rectifying apparatus." The medal and certificate will be presented to him at the national technical meeting of the institute, which is to be held in Cleveland, Ohio, from June 21 to 25.

THE Joseph A. Capps Prize for medical research of the Institute of Medicine of Chicago, founded by Dr. and Mrs. Edwin R. LeCount, has been awarded for 1942 to Dr. Mary E. Martin, Northwestern University Medical School (1941), for her investigation on "The Distribution of Nerves in the Adult Human Myometrium."

Nature reports that the Clough Memorial Medal of the Edinburgh Geological Society for the years 1941-1942 has been presented to James L. Begg, of Mount Vernon, Glasgow, for his contributions to Scottish paleontology. He has worked for many

years on the Ordovician rocks of southern Scotland and has discovered more than a hundred new species of trilobites, molluscs, brachiopods and other organisms, many of which belong to new genera. Mr. Begg, who is a past president of the Geological Society of Glasgow, has also served as its honorary treasurer for the past twenty-five years.

THE James Alfred Ewing Medal for 1942, on the joint recommendation of the presidents of the Royal Society and the British Institution of Civil Engineers, has been awarded to Dr. R. E. Stradling. The medal is awarded annually in recognition of specially meritorious research in the science of engineering.

THE Worcester Polytechnic Institute at commencement on February 11 conferred the degree of doctor of science on Dr. A. Wilmer Duff, professor emeritus of physics. Dr. Duff was presented by his successor, Dr. Masius, now head of the department.

THE following have been elected officers of the American Society for X-Ray and Electron Diffraction for the year 1943: *President*, Professor M. J. Buerger, the Massachusetts Institute of Technology; *Vice-president* and *President-elect*, Dr. L. H. Germer, Bell Telephone Laboratories, Murray Hill, N. J.; *Secretary-Treasurer*, Dr. George Tunell, Geophysical Laboratory, Washington, D. C.

OFFICERS of the American Society of Plant Taxonomists have been elected as follows: *President*, Dr. S. F. Blake; *Secretary and Treasurer*, Dr. N. C. Fassett; *Chairman of the Council*, Dr. E. E. Sherff.

THE Eastern Missouri Branch of the Society of American Bacteriologists has elected the following officers for the year 1943: *President*, Dr. Jane Burn Hershey, the Public Health Laboratories of the City of St. Louis; *Vice-president*, Dr. John B. Rehm, Research Laboratories, the Anheuser-Busch Company, and *Secretary-Treasurer*, Dr. Fred W. Gallagher, department of bacteriology, St. Louis University School of Medicine.

PHILIP GOLDSMITH, formerly sanitary engineer in the Department of Public Works of New York City, has been appointed acting director of the sanitary engineering research laboratory of the College of Engineering of New York University. He takes the place of Dr. Rolf Eliassen, who is on leave of absence as a captain in the United States Army.

DR. ROLLO C. BAKER, secretary of the College of Medicine of the Ohio State University since 1934, has been named acting dean of the college and acting director of the University Hospital. Dr. Baker was temporarily appointed to fill the position made vacant on January 15 by the death of Dr. Leslie L. Bigelow, Columbus. Dr. Bigelow had also been serving under

a temporary appointment, while Dr. Hardy A. Kemp, Columbus, was absent on military service.

DR. FORREST W. QUACKENBUSH, of the department of biochemistry of the University of Wisconsin, has been appointed head of the department of agricultural chemistry of Purdue University. He takes the place of Dr. H. R. Kraybill and will be in charge of agriculture and research in the Agricultural Experiment Station. He will also be state chemist in charge of feed, seed, fertilizer and plant inoculant control for the State of Indiana.

DR. RICHARD M. EAKIN has been appointed chairman of the department of zoology of the University of California at Berkeley. He succeeds the late Professor J. Frank Daniel.

DR. JAMES A. DAWSON, associate professor of biology at the College of the City of New York, has been promoted to a professorship.

DR. MARIA J. A. VAN DER LUGT has been appointed assistant professor of psychology at the University of Vermont. She takes the place of Professor R. M. Collier, now a first lieutenant in the United States Army.

DR. FRANK A. CALDERONE, of the department of preventive medicine at New York University Medical School, has been made deputy health commissioner of New York City to succeed Dr. George T. Palmer, who has resigned.

DR. H. E. WOOD, professor of biology at the University of Newark and research associate in fossil mammals at the American Museum of Natural History, is now first lieutenant assigned to the Army Air Force.

CLIFFORD COOK FURNAS, associate professor of chemical engineering at Yale University, has been appointed director of research for the Airplane Division of Curtiss-Wright Corporation.

PHILIP N. YOUTZ, formerly director of the Brooklyn Museum and director of the Pacific House at the Golden Gate International Exposition, has been made chief engineer, Consumer Products Branch, Office of Production Research and Development of the War Production Board, Washington.

DR. A. DOROTHY BERGNER, of the department of genetics of the Carnegie Institution of Washington at Cold Spring Harbor, N. Y., has become associated with the Guayule Research Project of the Bureau of Plant Industry at Salinas, Calif.

W. A. PATTERSON, president of United Air Lines, has been elected to membership on the advisory board of the Institute of Aeronautical Sciences, Inc.

NORMAN NEAL, of the departments of agronomy

and genetics of the University of Wisconsin, with the approval of the Office of the Coordinator of Inter-American Affairs, has been invited by the Uruguayan Government to visit Uruguay to investigate opportunities for improving its maize and corn production.

COLONEL RICHARD P. STRONG, M.C., Army of the United States, director of tropical medicine in the Army Medical School, Washington, D. C., delivered on January 26 two lectures at the Harvard Medical School. His subjects were "The Importance of Tropical Infectious Diseases in the Present War" and "Diagnosis and Prevention of Plague and Cholera." On February 3, he delivered the Smith-Reed-Russell Lecture at George Washington Medical School on "Problems Regarding Malaria, Typhus Fever, Dysentery and Tropical Parasitic Infections in the War Areas."

At the annual meeting in Chicago of the Heart Association on February 25, Dr. Arno B. Luckhardt, professor of physiology at the School of Medicine of the University of Chicago, was the guest speaker. He spoke on "Highlights and Shadows in the Discovery of General Anesthesia."

It is reported in *Nature* that the Association of Polish Technicians in Great Britain held on January 17 a special tercentenary celebration of Isaac Newton, under the chairmanship of Professor Max Born, of the Mathematical Institute of the University of Edinburgh. Addresses were delivered by Professor E. T. Whittaker and Dr. S. Neumark, formerly dozent in aeronautics in the University of Warsaw and now a flight lieutenant in the Polish Air Force. He was introduced by Major Chodacki, formerly high commissioner for Danzig.

PROFESSOR R. T. CLAUSEN writes: "The botanical letters and papers of the late Professor Karl M. Wiegand (see *SCIENCE*, 95: 449-450, 1942), formerly head of the department of botany at Cornell University, have been deposited in the Cornell University Library at Ithaca, N. Y. These papers and letters are available for consultation by qualified scholars. Copies of particular items will be prepared upon the request of other institutions to the extent permitted by the facilities and time of the library's personnel."

THE American Association of Dental Schools will hold its twentieth annual meeting at the Drake Hotel, Chicago, on March 15, 16 and 17.

THE third program meeting of the New York Bacteriologists' War Research Projects Group will be held on the evening of March 3 at the College of Physicians and Surgeons, New York. Dr. M. L. Isaacs, of Yeshiva College; Dr. Selman A. Waksman, of the New Jersey Agricultural Experiment Station; Dr. Orville Wyss, of Wallace and Tiernan Products,

Inc., and Dr. Geoffrey W. Rake, of the Squibb Institute for Medical Research, will participate in a discussion on "War Problems of Disinfection and Antisepsis." As in previous meetings, general discussion from the floor following the presentations will aim to formulate research projects to be undertaken by members of the group.

A SYMPOSIUM on the utility of lattice designs for field experiments undertaken as part of a plant-breeding program was the subject of a joint meeting of the Biometrics Section of the American Statistical Association and the American Society of Agronomy held in St. Louis on November 11 under the chairmanship of H. M. Tysdal. The program included an outline of the general properties of the designs by W. G. Cochran, a presentation of the methods of computation by F. R. Immer, and discussions of the conditions under which lattice designs should be used by G. W. Snedecor and S. C. Salmon. Reports on experience under practical conditions were contributed by seven agronomists—E. G. Heyne, I. J. Johnson, C. A. Lamb, W. M. Meyers, J. A. Rigney, J. H. Torrie and E. J. Wellhausen—and by members of the audience. Corn, wheat, oats, soybeans, clover and Kentucky bluegrass were crops with which these designs had been used.

THE *Bulletin* of the Institute of International Education writes: "Beginning on February 1, a six months' course in meteorology was initiated at Medellin, Colombia, by the United States Weather Bureau for students from all the American republics. Upon the completion of the course, it is planned to bring a number of the honor students to the United States for more extensive training in the following universities: the Massachusetts Institute of Technology, New York University, the University of Chicago, the California Institute of Technology, and the University of California at Los Angeles. This study will be followed by assignment of two months' active duty with the United States Weather Bureau. Some 200 students will be trained under this plan, which was developed by the Weather Bureau, the Department of State, the Office of the Coordinator of Inter-American Affairs and the Defense Supplies Corporation."

AN Associated Press dispatch reports that the council on medical education and hospitals of the American Medical Association has announced that the University of Georgia School of Medicine has been fully restored to its list of approved medical schools.

It is announced that the New York Zoological Society is planning to establish a research center in the Zoological Park for the study of animal diseases in relation to human disease problems and a conservation exhibit. The society will receive \$3,000,000 under the terms of a post-war program for the city.

## DISCUSSION

## AIR-AGE TEACHING OR MISINFORMING?

THE tremendous impetus given to aviation by the war has resulted in a veritable flood of books covering every possible phase of aviation, and ranging from popular treatises to text-books to be used for instructional purposes. One of the most ambitious of the latter is an entire series of books published by Teachers College, Columbia University, under the editorship of Dr. Ben Wood, professor of psychology. The editor writes in his introduction that this "Air-Age Education Series represents a major step in providing schools with teaching materials." One can certainly have nothing but praise for such a purpose, especially since the series is attractive in appearance and well written. However, a little closer examination of some of the volumes in this series reveals that their authors may have been enthusiastic but that they were also woefully uninformed about many fundamentals.

To wit: In "The Air-Age We live in," by Renner-Bauer, the following picture is drawn for us: The earth is not 8,000 miles but really 50,000 miles in diameter, the atmosphere ends at 21,000 miles above the solid surface because gravitation stops abruptly at that point. Oxygen and nitrogen cease to exist at altitudes higher than 80 miles, above which one finds only hydrogen and helium. At the top of the atmosphere the particles of air may be many feet apart, perhaps even miles, and the temperature up there is the same as that of interplanetary space—absolute zero. If a man were hauled up to the top of the atmosphere he would explode.

All these statements are not only wrong but they present striking evidence that the authors do not understand the principles of the physical universe. Thus, to mention but one point, they appear to confuse the average distance apart between particles with the mean free path, and when they give the pressure exerted by the ocean on a fish at a depth of five miles as 11,458 pounds per square inch, the 8 may be correct but the 4 is certainly wrong.

In "Globes, Maps, and Skyways" by Bauer the statements are made: "... that the shortest air route from Buenos Aires to Melbourne or from Auckland to Cape Town leads almost directly across the South Pole was perhaps an unexpected discovery." Very unexpected indeed because in both cases the great circle route misses the pole by more than 1,000 miles. The usually accepted dates of equinoxes and solstices are March 21, September 23 and June 22, December 22, not September 22, June 21, December 21. The "small correction" due to the fact that the Pole Star is not at the Pole is not small, but may amount to 70 miles. On page 62 the author makes the flat statement

(and even draws a figure to "prove" it) that "the latitude of the observer equals the observed altitude of the sun plus its declination." If true, this would place the sun overhead at the North Pole on March 21—such a howler would by itself alone condemn the book and when the author modestly pontificates that the "principles of global flight which we have discussed in the preceding pages of this book should from now on be used in all geography courses so that revolutionary changes in world traffic may be fully understood," one can only comment: God forbid.

In "Human Geography and the Air Age" by Renner we are dealing with the outpourings of that great self-confessed genius who considers himself superior to all the "amateurs in the State Departments" in planning the post-war world and who thus, from all this wisdom, proposed to end all future trouble in the Balkans by giving Italy the entire Dalmatian Coast—doubtless as a reward for having first massacred most of the inhabitants. To find a person who claims to be a geographer, economist, historian, political scientist, linguist and transportation expert stating that the British built the Suez Canal, and that the Rhine Valley lies in Austria is quite a record. Mr. Renner is wont to complain about the fact that the British control all but one of the bottlenecks between oceans. The "bottleneck" between Cape Agulhaes and the Antarctic Continent is some 2,400 miles wide—"some neck," as Mr. Churchill might say—and it is also a good deal wider than that between Brazil and Dakar, which is not mentioned at all doubtless because it is not controlled by the hated British.

In the latitude of Hammerfest—70.7 degrees north—the earth's rotational speed amounts to about 340 miles per hour, instead of 250, and hence the entire elaborate simile built up on this falls flat. The statement about the aviator flying westward from Oslo on March 21, and thus having a day of 16 hours, and a night of only 8 hours shows a complete lack of understanding of relative motion.

"The World created by the Airplane can best be shown on a map which radiates outward from the North Pole." This would be fine for the Isolationist Eskimo Aviation Corporation with headquarters on an icefloe at the north pole, but since it is obvious that in the immediate post-war world air transportation will be centered around the U. S. the map should be drawn with the U. S. as center—if at all. The type of map claimed as "new" by Renner has been used by astronomers for centuries—only astronomers are well aware of its imperfections and distortions. On the map as given by Renner the distance from Cape Horn to Hobart, *e.g.*, appears to be 18,000 miles—

actually it is only 4,600. There are few places on a Mercator map that are as badly off as that.

A large part of the book is given over to a discussion of the war and its strategy. Herr Doktor Renner, who likes to refer to our general staff as composed of "admirals, generals and similar elderly people" assures us that these people suffer not from being blind but merely from hindsight, whereas it is intimated that the author combines the foresight of Columbus, Major General Haushofer and General Billy Mitchell. Mr. Renner speaks feelingly about illiteracy when referring to people who do not agree with him, and about "Tragic maps," *i.e.*, all maps that do not have the north pole at the center. The only statement that I can heartily agree with is his: "The ideas of uninformed people do not have much shape or dimension." Certainly the ideas of the uninformed amateurs of Teachers College are sometimes badly misshapen.

The authors of these three books have made a great discovery: the earth is round. So now they want to share this discovery with the rest of us who are merely illiterate believers in the tragic Mercator maps, and who possess only hindsight, if any. And all this has to be done with the magic word "global." The real tragedy lies in that these books come dressed up with copious references to the Civil Aeronautics Administration which will be mistaken by many still less-informed people as indication of approval by the C.A.A. There probably are few fields of education where the need for good, simple, but correct texts is as great as it is in aviation—in all of its aspects. If books such as these, containing a vast amount of misinformation, should be adopted in many schools, they could warp the thinking of countless students, and do untold harm to the future of aviation.

WILLEM J. LUYTEN

UNIVERSITY OF MINNESOTA

### SOMATIC MUTATIONS IN THE APPLE

SOMATIC mutations in apple varieties resulting in a change in the distribution pattern of the color in the epidermal cells of the fruit are quite common. Certain of these mutations are of increasing importance in nurseries and orchards. Most of these differ only in fruit color pattern and can not be identified by tree characters. Van Buren, which is reported to be a somatic mutation of the Duchess of Oldenburg variety, is an exception. It differs in many characters from its supposed somatic parent.

The McIntosh variety has produced many color mutations. Color patterns vary from distinctly striped to uniformly red with no trace of stripes or splashes. The type almost always comes true in asexual propagation. The striped form is generally regarded as the original, but there is evidence that

the original McIntosh tree bore apples that were of a uniform red.

There are under propagation at the Massachusetts Experiment Station a considerable number of reputed mutations of the McIntosh apple. Two of them have been in nursery propagation for several years and produce apples that are of a uniform red and very similar if not identical in all fruit characters. They can not be distinguished by vegetative characters. Budded on most stocks, they behave alike, though one type known as Type G is sometimes a little slower than the type called R in starting growth from the inserted bud.

These two types were budded in 1941 on a clonal stock known as Spy 227. Both started growth normally in 1942, but by midsummer all the budlings of Type R were dead or dying, while those of Type G grew normally all summer. The varieties Stayman and Winesap, both on this stock, behaved much like Type R, Stayman budlings dying even earlier than Type R, while Winesap lived a little longer. It is remarkable that these two types, very similar and probably indistinguishable in all external characters, show such a striking difference in behavior when budded on this particular stock. The test is being repeated, including several additional types of McIntosh and varieties more or less related to the Winesap and Stayman.

J. K. SHAW

L. SOUTHWICK

MASSACHUSETTS STATE COLLEGE

### FRANZ BOAS, HIS PREDECESSORS AND HIS CONTEMPORARIES

IN her appreciation of Franz Boas (*SCIENCE*, 97: 2507, 60-62, 1943) Professor Benedict properly stresses the progressive shift in his anthropological interests and his unusual capacity for formulating problems so as to bring them nearer solution. However, two points in her article require further elucidation: one of them concerns Ratzel; the other, Boas's relations to predecessors and coevals.

So far as I can discover, Ratzel lectured at Munich and Leipzig, whereas Boas studied at Heidelberg, Bonn and Kiel. It is thus not clear how Ratzel can be called "his teacher." Incidentally, Ratzel was not nearly so intransigent an environmentalist as is commonly supposed.

Far more important is the second issue. We read: "He [Boas] found anthropology a collection of wild guesses and a happy hunting ground for the romantic lover of primitive things; he left it a discipline in which theories could be tested and in which he had delimited possibilities from impossibilities." Professor Benedict is of course entitled to her own reading of history. But unfortunately her statement might be mistaken for the general sentiment of a Boas

"school" and accordingly—after discussion with Drs. A. L. Kroeber and Paul Radin, two other one-time students of Boas—I feel compelled to register my vehement, uncompromising dissent.

To take only two predecessors, E. B. Tylor emphatically did not indulge in wild guesses nor did he collect anthropological facts as a philatelist collects stamps; and Lewis H. Morgan, his misconceptions to the contrary notwithstanding, created absolutely new lines of fruitful inquiry in which the "romantic lover of primitive things" would be very unhappy indeed.

As for contemporaries, Boas highly esteemed such men as Karl von den Steinen, Eduard Hahn, Eduard Seler; and irrespective of divergences of opinion he

recognized the ability of Daniel G. Brinton and Wm. H. Holmes. The notion that he was a culture hero of the type featured by aboriginal folklore, a bringer of light out of total darkness, was intensely distasteful to him; he explicitly repudiated it in a letter to me (December 30, 1937). I have tried elsewhere to sketch Boas's unique services to science. They were sufficiently great not to require the belittlement of others, which must inevitably evoke legitimate resentment, ruffling national no less than personal sensibilities. *De mortuis nil nisi verum.*

ROBERT H. LOWIE

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## SCIENTIFIC BOOKS

### PHYSICAL CHEMISTRY

*Elementary Physical Chemistry.* By MERLE RANDALL and LEONA ESTHER YOUNG. xiv + 455 pp. Berkeley, Calif.: Randall and Sons. 1942. \$4.50.

THE chief novelty of this text is the unusual arrangement of subject-matter. Early chapters deal with vaporization, distillation, solubility product, dissociation of electrolytes, hydrolysis and indicators. Gases are first discussed in detail in Chapter XIII; and as a matter of fact, from this point on the remaining material is presented in a more orthodox sequence. The purpose is "... to utilize the experiments performed by students in the elementary organic and quantitative laboratories as the basis of establishing the fundamental principles of modern thinking in this field."

The authorship guarantees a presentation with a strong thermodynamic bias, though this does not extend to a detailed discussion of the laws of thermodynamics. However, the language is the language of thermodynamics. The selection of material likewise betrays a preoccupation with thermodynamics or, more particularly, with the common equilibrium systems. Thus, such topics as atomic and molecular structure, crystal structure, colloidal systems and reaction mechanism receive only a legal minimum of attention.

Providing the remainder of the curriculum is closely attuned, this might be a very useful text. Helpful adjuncts are the numerous problems, tables and figures.

*Experimental Physical Chemistry.* By W. G. PALMER. xii + 321 pp. Cambridge, England: Cambridge University Press. 1941. \$2.75.

THIS laboratory manual follows accepted lines for the most part. Chapters are devoted to densities of gases and vapors, crystallization and the properties

of crystals, solutions and solubility, dilute solutions, thermochemistry, ionization, velocity of chemical reaction, surface chemistry. Optical instruments and their uses are not discussed.

Each experiment is preceded by a brief theoretical introduction. Detailed procedures are given, and there is usually a completely worked example. A point is made of the simplicity of the apparatus required. A number of the experiments are of a qualitative nature.

The text should be useful in an elementary course in physical chemistry, though it is not clearly superior to other texts on the market.

ROBERT N. PEASE

### ORGANIC CHEMISTRY

*The Quadri-Service Manual of Organic Chemistry.* By EDWARD DEGERING. 221 pp. Houghton Mifflin Company. 1942. \$2.50.

THE author has introduced a novel presentation of organic laboratory material and the scope of experiments included shows a definite shift from the traditional type of organic laboratory manual. The experiments are designed to cover the aliphatic and aromatic series and the planning is such that experiments may be chosen from both series for a one-semester course primarily for premedical students. The introduction of organic experiments on a semi-micro basis is a valuable contribution and will no doubt impress upon the student the importance of maintaining his laboratory techniques throughout his organic chemistry training. Objective type tests are included throughout the manual primarily as a method of review. However, the value of these tests for the beginning organic chemistry student is a debatable question. The reviewer feels that the objective type tests in organic chemistry can be a teaching aid only after the completion of the elementary course in or-

ganic chemistry, inasmuch as this type of test trains the student only in his ability to recognize material once learned, while his training in being able to recall and apply his knowledge is neglected. Nevertheless,

this organic laboratory manual demands the attention of every serious-minded teacher of organic chemistry.

ROBERT G. LINVILLE

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## AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

### DIGEST OF THE MINUTES OF THE EXECUTIVE COMMITTEE

POSTPONEMENT of the New York meeting, scheduled to have been held during the week of December 28, 1942, prevented the holding of the regular business sessions of the Executive Committee and of the Council at that time. Acting under a provision of the Constitution and By-Laws that "the Executive Committee shall have full power to act for the Council when the Council is not in session," the Executive Committee held a special meeting in Washington, D. C., on January 17, 1943, with eight of the ten members present, as follows: Drs. Livingston (chairman), Adams, Barker, Caldwell, Cannon, Compton, Moulton and Wrather.

The following actions were taken, all of which were by unanimous vote:

1. It was voted (a) that all work of the association, except the holding of general meetings, be continued until the holding of meetings is resumed, presumably after the close of the war; (b) that new officers of the association be elected by mail ballot of the council, a procedure that is valid under the constitution and by-laws of the association; (c) that joint local meetings with affiliated academies of science and joint local meetings of sections and affiliated societies be held when feasible; (d) that the special committees of the association be continued under the usual terms of tenure, and (e) that arrangements be made, if possible, for broadcasting addresses of retiring presidents.

2. In accordance with 1(b), it was voted that the council elect by mail ballot the president of the association for 1943, three members for the executive committee, two elected members of the council, and the vice-presidents for sections. (Report of the results of the balloting by the council, now in progress, will be published in *SCIENCE*.)

3. The following were elected a committee for the subsection on dentistry: Thomas J. Hill, chairman, 2085 Adelbert Road, Cleveland, Ohio; Paul C. Kitchin, secretary, Ohio State University; and B. Holly Broadbent, 2879 Fontenay Road, Cleveland, Ohio.

4. Glenn L. Jenkins, Purdue University, was elected chairman of the subsection on pharmacy for a three-year term, expiring at the end of 1945.

5. President Compton appointed R. G. Hoskins, Harvard University, and Henry Gilman, Iowa State University, as members of the grants committee, to represent medicine and chemistry, respectively, for terms ending at the close of the year 1946.

6. On recommendation of the finance committee, Charles S. Baker, Washington, D. C., was elected a member of the finance committee to succeed himself, for a four-year term ending at the close of the year 1946.

7. J. McKeen Cattell was nominated to succeed himself as a representative on the board of trustees of Science Service for a three-year term ending in April, 1946.

8. The Arkansas Academy of Science was accepted as an affiliated state academy and the American Association of Scientific Workers was accepted as an affiliated society.

9. The reports of the auditors (certified public accountants) of the accounts of the treasurer and of the permanent secretary for the fiscal year ended September 30, 1942, were accepted.

10. The executive committee approved the recommendation of the permanent secretary that in making arrangements for future meetings of the association the local committees in the communities in which meetings are to be held be charged with the responsibility of arranging for entertainment and excursions and providing clerical and other services, as heretofore, but be relieved from the onerous and disagreeable task of collecting funds for printing the general program and meeting other expenses.

11. The policy, in general, was adopted that hereafter grants for research shall be given only to applicants who have not previously received two grants from the association or from other sources in support of the research for which the application is made.

12. In carrying out certain terms of the agreement between the association and Dr. J. McKeen Cattell and Mrs. Josephine Owen Cattell, in so far as it concerns *The Scientific Monthly*, the permanent secretary was authorized and directed to accept the offer of Dr. and Mrs. Cattell and to pay \$9,499.59 in lieu of the annuity provided in the agreement, and Mr. Ware Cattell was elected as editor for a four-year term beginning January 1, 1943. The permanent secretary was also directed to publish *The Scientific*

*Monthly* in the name of the association and to accept the detailed unit cost estimate of the Science Press Printing Company for printing and mailing *The Scientific Monthly* for the calendar year 1943.

13. The following committees on resolutions were appointed:

(a) Resolution on interrelations of scientists of the Western Hemisphere. Dr. Walter B. Cannon was appointed chairman and Dr. E. C. Stakman was appointed a member of the committee. The chairman was authorized to appoint other members to the committee.

(b) Resolution in support of the war efforts of the Government. Dr. James B. Conant was appointed chairman, with authority to appoint other members to the committee.

(c) Resolution on freedom. Dr. Harlow Shapley was appointed chairman and Dr. Isaiah Bowman was appointed a member of the committee. The chairman was authorized to appoint other members to the committee.

(d) Resolution on declaration of scientific objectives. Dr. F. R. Moulton was appointed chairman with authority to appoint other members to the committee.

14. The following resolution in commemoration of

the hundredth anniversary of the National University of Chile was adopted:

WHEREAS, the National University of Chile has recently celebrated its centennial, and,

WHEREAS, among its faculties are included many of the outstanding scientists of the Western Hemisphere, and,

WHEREAS, since science transcends national boundaries and forms part of a worldwide culture,

Therefore, be it resolved, in recognition of the identity of its interests with those of the distinguished scientists of the National University of Chile, and the strong cultural bonds that link the scientific workers of the hemisphere, that the American Association for the Advancement of Science send its felicitations to the National University of Chile and its rector, on the part of the scientists of the United States of North America, and,

Be it further resolved, That the American Association for the Advancement of Science, in anticipation of closer cooperation of the scientists of the hemisphere, cordially invite the university to take steps leading to such cooperation.

15. It was voted to cancel the New York meeting, previously postponed on request of the Office of Defense Transportation.

## SPECIAL ARTICLES

### ON ESTERS OF PENICILLIN<sup>1,2</sup>

THE chemotherapeutic effect of penicillin against the Gram-positive cocci in experimental animals and in man has been unequaled by any other agent so far tried. The practical use of penicillin, however, is still attended with some difficulties because of the instability and rapid excretion of the material. In a previous publication<sup>3</sup> we have described attempts to stabilize penicillin by selective acetylation and benzylation of the hydroxyl groups. Though the stability of such derivatives, especially of the benzoyl compound, was greater than that of the original penicillin, the products held no great promise.

Since the instability of penicillin, especially in acid solution, is partly due to the lability of a carboxyl group,<sup>4,5</sup> experiments on esterification have been carried out by us during the past year and a half. The Oxford workers recently reported<sup>4</sup> unsuccessful attempts to esterify the silver salt of penicillin with

alkyl iodides. We have prepared the methyl, ethyl, n-butyl and benzohydryl esters by reacting the free acid of penicillin with the corresponding diazo compound. In contrast to the starting material, the esters are insoluble in neutral or slightly alkaline buffers, they are very soluble in benzene and are not precipitated from chloroform-benzene solutions by dry ammonia. On analysis, the methyl and ethyl esters were found to contain around 10 per cent. of alkoxyl. Chromatographically the esters prepared from unfractionated penicillin showed three components.

*In vitro* the aliphatic esters have an activity of about 25 micrograms per cc in contrast to 0.08 to 0.3 micrograms per cc for the original penicillin fractions against hemolytic streptococci. The dilution method was used for these titrations.<sup>6</sup> The constant and low activity of the esters is probably due to a partial hydrolysis of the esters by the hemolytic streptococci.

The aliphatic esters show, in contrast to their relative inactivity *in vitro*, a marked activity in mice. Mice were infected by the intraperitoneal injection of 1 cc of 10<sup>-3</sup>, 10<sup>-4</sup> and 10<sup>-5</sup> dilutions of a highly virulent strain of hemolytic streptococcus (C<sub>203</sub>Mv). Treatment by the subcutaneous route was begun

<sup>6</sup> G. L. Hobby, K. Meyer and E. Chaffee, *Proc. Soc. Exp. Biol. and Med.*, 50: 277, 1942.

<sup>1</sup> From the Departments of Ophthalmology and Medicine, College of Physicians and Surgeons, Columbia University, and the Edward Daniels Faulkner Arthritis Clinic, Presbyterian Hospital, New York.

<sup>2</sup> This work has been supported in part by a grant from the John and Mary R. Markle Foundation.

<sup>3</sup> K. Meyer *et al.*, *SCIENCE*, 96: 20, 1942.

<sup>4</sup> E. P. Abraham and E. Chain, *Brit. Jour. Exp. Path.*, 23: 103, 1942.

<sup>5</sup> Unpublished experiments.

within two hours after infection and was carried out for a period of two to three days only. Table I shows the high degree of protection obtained with relatively small amounts of the ethyl ester.

TABLE I

Total amount of ester in mgs	Dilution of culture (strain C <sub>203</sub> MV)	Number of mice	Number died (< 48 hrs.)	Number survived (> 7 days)
2.5-4.5	10 <sup>-3</sup>	11		11
	10 <sup>-4</sup>	12		12
	10 <sup>-5</sup>	13	1	12
1.37	10 <sup>-3</sup>	3		3
	10 <sup>-4</sup>	3	1	2
	10 <sup>-5</sup>	3		3
0.6	10 <sup>-3</sup>	3	2	1
	10 <sup>-4</sup>	2	1	1
	10 <sup>-5</sup>	3	1	2
Controls	10 <sup>-6</sup>	12	12	
	10 <sup>-7</sup>	12	12	

A total dose of less than 1.5 mg of the ethyl ester gives complete protection against a 10<sup>-3</sup> dilution (20,000 to 100,000 lethal doses) of hemolytic streptococci. With the methyl ester, essentially the same results have been obtained, except that a total of at least 2.5 mg was necessary. With penicillin preparations having an activity similar to that of the fractions from which these esters have been made, considerably larger amounts were necessary. The increased stability of the methyl and ethyl esters is illustrated by preliminary experiments indicating that partial protection is obtained by oral administration.

The benzohydril ester mixture, in contrast to the aliphatic compounds, is hydrolyzed by the test organism. It has a constant *in vitro* activity of 0.3 to 0.6 micrograms per cc which is comparable to the activity of the starting material. The mouse seems to be unable to hydrolyze this compound, however, as no protection was obtained with the dosage employed. The compound is of interest, nevertheless, since it can be split by catalytic hydrogenation with colloidal palladium, giving a highly active acid fraction.

KARL MEYER  
GLADYS L. HOBBY  
ELEANOR CHAFFEE

#### THE INFLUENCE OF BIOTIN UPON SUSCEPTIBILITY TO MALARIA

It has long been known that individuals differ in their degree of natural susceptibility to malaria. Almost nothing is known, however, concerning the factors responsible for these differences, nor has it been possible in the past to markedly affect the degree of natural susceptibility to experimental malaria, whether human, simian or avian. Experiments with avian malaria have now shown that the level in the

host animal of biotin,<sup>1</sup> an important growth factor, greatly influences the severity of the infection. Also significant is the fact that the concentration of biotin in the blood reaches two or three times its normal value at the peak of an acute experimental malarial infection, and then returns to normal when the infection has subsided.

Most of the work has been done with *Plasmodium lophurae*<sup>2</sup> infections in young chickens and ducks. Chickens or ducks, rendered biotin-deficient by maintenance on an egg-white diet<sup>3</sup> for two or three weeks and subsequently inoculated with large doses of *P. lophurae*, showed peak parasite numbers 50 to 100 per cent. higher than those shown by control animals. Among the biotin-deficient animals, the parasite number persisted at a high level several days longer, and more animals died of the malarial infection than among the controls. The greater susceptibility of the biotin-deficient animals was not directly connected with any general weakness resulting from the biotin deficiency. Chickens or ducks made extremely weak on a pantothenic acid-deficient diet did not develop any heavier infections with *P. lophurae* than did the robust animals which received the same diet supplemented with calcium pantothenate. Moreover, chickens which were provided with just enough biotin so that they grew well and were quite normal, except for a mild scaly dermatitis of the feet, developed more severe infections than chickens provided with more nearly adequate amounts of biotin. Here, in the presence of a small degree of biotin deficiency, the administration of additional biotin acted as a specific therapeutic measure to lessen the severity of the infection. It is also pertinent that older chickens, which are more resistant to *P. lophurae* infection than young chickens,<sup>2</sup> showed a higher level of biotin in the blood.<sup>4</sup>

Chickens kept on egg white diet and infected with *Plasmodium gallinaceum*,<sup>5</sup> either by sporozoites or by blood inoculation, showed higher average peak parasite numbers in the blood than control animals on a similar diet with the egg white replaced by casein. Biotin-deficient ducks infected with *P. cathemerium*<sup>6</sup> did not show higher peak parasite numbers than the non-deficient animals, but their infections persisted at a high level for several days after the blood of the

<sup>1</sup> V. du Vigneaud, *SCIENCE*, 96: 455, 1942.

<sup>2</sup> L. T. Coggeshall, *Am. Jour. Hyg.*, 27: 615, 1938.

<sup>3</sup> R. E. Eakin, W. A. McKinley and R. J. Williams, *SCIENCE*, 92: 224, 1940.

<sup>4</sup> Total biotin (after acid hydrolysis by the method of J. A. Lampen, G. P. Bahler and W. H. Peterson, *Jour. Nutrition*, 23: 11, 1942) was determined by the microbiological assay method of G. M. Shull, B. L. Hutchings and W. H. Peterson, *Jour. Biol. Chem.*, 142: 913, 1942.

<sup>5</sup> The work with *P. gallinaceum* was done at the laboratories of the International Health Division of the Rockefeller Foundation with the generous cooperation of Dr. J. Maier.

<sup>6</sup> Duck strain 3 T kindly sent me by Dr. Fruma Wolfson.

controls was virtually free from demonstrable parasites. Several of the biotin-deficient ducks infected with *P. cathemerium* died from the infection.

In both chickens and ducks, whether on a deficient or an adequate diet, the concentration of biotin in the plasma and red blood cells rose during the course of infection with *P. lophurae*. This rise can not be explained solely on the basis of the new red cells formed in response to the anemia produced by the parasites. In ducks, an increased biotin level was already apparent by the fourth day after inoculation, when there was as yet no large proportion of young red cells; the increase appeared in the plasma as well as in the red cells; and both plasma and red cells were back to a normal biotin level by the eighth day after inoculation, when a large proportion of young red cells was still present. Since *P. lophurae* multiplies to a greater extent in animals with a relatively low initial biotin level than in those with a higher initial biotin level, the increase in biotin which occurs during the course of the infection may well be concerned with the elimination of the parasites from the blood.

Whether these findings with avian malaria apply to simian or human malaria can be determined only by extended observations on body biotin levels in these species in relation to the degree of susceptibility to malarial infection. Certainly the results with chickens and ducks would indicate that biotin is one substance of known chemical nature which helps to determine the degree of resistance of the host to infection with malarial parasites. These results are also of interest in that they provide an example, in addition to the very few thus far discovered,<sup>7</sup> of a specific relation between a nutritional deficiency and susceptibility to an infectious disease. The full details of this work are to be published shortly.

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# RELATION OF FOOD INTAKE TO RESPONSE OF MICE INOCULATED WITH LANSING STRAIN OF MURINE POLIO- MYELITIS VIRUS<sup>1</sup>

In a recent preliminary communication<sup>2</sup> we reported that mice on a vitamin B<sub>1</sub>-deficient diet showed increased resistance, over a period of 30 days, to the Lansing strain of murine poliomyelitis virus. Since then these observations have been confirmed, and in addition we have found that simple restriction of food intake will produce comparable results. In several trials, feeding of about 40 per cent. of the usual daily consumption definitely extended the time before the onset of paralysis and the time of death. To at least the twenty-first day after inoculation there was a statistically significant difference in deaths and cases of paralysis between the restricted groups and those fed ad libitum. This difference had disappeared by the twenty-seventh day.

In one experiment, 176 mice were divided into 6 groups. Group I received a synthetic diet (diet 100), Groups II and III a stock diet (diet 483) and Groups IV, V and VI a synthetic diet in which the relative amounts of all ingredients except carbohydrate were increased at the expense of the latter (diet 515). Groups I, II and IV were fed ad libitum and the other groups were given 1 gm of food per animal per day. On the third day of the experiment, Groups I to V inclusive were injected intracerebrally with a suspension of mouse brain infected with the Lansing strain of murine poliomyelitis virus. This amount of virus corresponded to between 500 and 1,000 fifty-per cent.-mortality doses. Group VI was injected with a suspension of normal brain. The cumulative percentages of animals dying and those showing paralysis by the tenth, fifteenth and twenty-first days after inoculation are given in Table 1. Any animals dying before the third day are not included in the totals.

Increasing the concentration of thiamin in the diet

TABLE 1

Group No.	No. mice 3 days after inoc.	Diet No.	Amt. of diet	Inoculum	Days after inoculation					
					10		15		21	
					Par. <sup>1</sup>	Death	Par. <sup>1</sup>	Death	Par. <sup>1</sup>	Death
					Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
I	16	100	ad lib	virus	88	94	88	100	88	100
II	35	483	ad lib	virus	80	94	80	100	80	100
III	39	483	1 gm	virus	10	10	33	28	56	67
IV	23	515	ad lib	virus	91	87	96	100	96	100
V	25	515	1 gm	virus	20	28	32	48	52	68
VI	23	515	1 gm	normal brain	..	26	..	39	..	44

<sup>1</sup> Paralysis.

<sup>7</sup> "Nutrition and Resistance to Disease," *Nutrition Reviews*, 1: 66, 1943.

<sup>1</sup> Aided by a grant from the National Foundation for Infantile Paralysis, Inc.

<sup>2</sup> *Proc. Soc. Exp. Biol. and Med.*, 51: 215, 1942.

so that the amount consumed by the animals on the restricted intake was at least double that of the animals on the unrestricted intake did not increase the incidence of paralysis or death. The administration of 0.5 ml of 0.3 per cent. saline twice daily by stomach tube to the mice on restricted intake, likewise did not significantly alter the results.

From the data it appears that restricting the intake of either the complete ration or just the carbohydrate

delays the manifestation in mice of infection with the Lansing strain of poliomyelitis virus.

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## SCIENTIFIC APPARATUS AND LABORATORY METHODS

### A SIMPLIFIED PROPYLENE GLYCOL DISPENSER FOR FIELD USE<sup>1</sup>

A CONSIDERABLE amount of work is in progress at the present time on the effectiveness of propylene glycol as an air disinfectant.<sup>2,3</sup> This agent is commonly employed in concentrations ranging from 1 gram per 5 million cc of air to 1 gram per 20 million cc of air<sup>3,4,5</sup> and is most conveniently introduced into the atmosphere by vaporization.

Because some of the suggested vaporizing equipment is rather elaborate and is not suited to large-scale field experiments, we have developed a simple device requiring no special materials for construction. It consists of an ordinary electric light bulb dipping into a beaker or tin can filled with propylene glycol. Preferably the unit is insulated to diminish heat loss by setting it in a larger container and packing paper into the space between the sides. A 10-inch electric fan is placed one or two feet away so that it directs an air stream across the liquid surface. The large heating area of the bulb eliminates the danger of local super-heating with consequent decomposition of the propylene glycol, and the inexpensiveness of the equipment makes it feasible to install as many units as may be necessary in order to maintain a given concentration of vapor.

In practice the rate of evaporation of propylene glycol from the vaporizers should be great enough to bring all the fresh air coming into the room to the concentration level desired. It is usually estimated that a closed room has 2 to 10 air turnovers per hour under ordinary circumstances. Therefore, if a room has a volume of 2,000 cubic feet and there are 5 air turnovers per hour it would require the vaporization

of 14 grams of propylene glycol per hour to maintain a concentration of 1 part propylene glycol in 20 million parts of air throughout the room. A single 50-watt bulb immersed in 700 cc of propylene glycol with a surface area of 18 square inches accomplishes this. The output of a vaporizing unit can readily be increased to 100 grams per hour by the selection of proper wattage and surface area.

For any given set of conditions the rate of evaporation of propylene glycol is a function of the temperature at the surface of the glycol. As an approximate figure for calculations we have found that an increase in vaporization amounting to 5 milligrams per minute per square inch of surface accompanies each degree (C.<sup>o</sup>) rise in temperature over the range 80° to 110° C. Since propylene glycol vapor has a fairly high specific gravity, vaporizers should be placed at least six feet from the floor and a sufficient number of fans should be installed to insure thorough mixing. Otherwise the vapor will sink to the floor and lead to erroneous interpretation of experimental data.

### THE PERSONNEL OF NAVAL LABORATORY RESEARCH UNIT No. 1<sup>6</sup>

BERKELEY, CALIF.

<sup>6</sup> The Unit Personnel consists of the following members of the U. S. Naval Reserve: Albert P. Krueger, Commander, MC-V (S), officer-in-charge; Lieutenants L. E. Rosenberg and N. S. West; Lieutenants (jg) A. S. Browne, O. J. Golub, A. H. Jacobs and J. R. Mathews; Ensigns A. J. Glazko, M. D. Thaxter and H. M. S. Watkins; Chief Pharmacist Mate I. L. Schechmeister; Pharmacist Mates First Class W. L. Axelrod, E. R. Chisholm and G. B. Saviers; Pharmacist Mates Second Class H. R. Burkhead and C. R. Webb, Jr.; Pharmacist Mate Third Class J. A. Gray, Jr.; and Pharmacist Mate First Class P. J. Smith and Hospital Apprentice Second Class D. D. Metz, both of the U. S. Navy.

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<sup>1</sup> The opinions advanced in this paper are those of the writers and do not represent the official views of the Navy Department.

<sup>2</sup> O. H. Robertson, E. Biggs, B. F. Miller and Z. Baker, *SCIENCE*, 93: 213, 1941.

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<sup>5</sup> W. Henle, H. E. Sommer and J. Stokes, *Jour. Pediatrics*, 21: 577, 1942.